CHAPTER 5
NOISE IMPACTS

Predictions of noise for Unit 9 as initially proposed by DPL at Vienna and alternative sites are contained in report PPSE 8-2. DPL has recently proposed to change from a round mechanical draft cooling tower to a natural draft cooling tower. The noise consequences of this change are that special nighttime operating conditions proposed for the round mechanical draft tower are no longer applicable. New noise calculations are contained in this overview report and in separate testimony for the pending PSC hearing. This chapter summarizes the major points of PPSE 8-2 and the revisions.

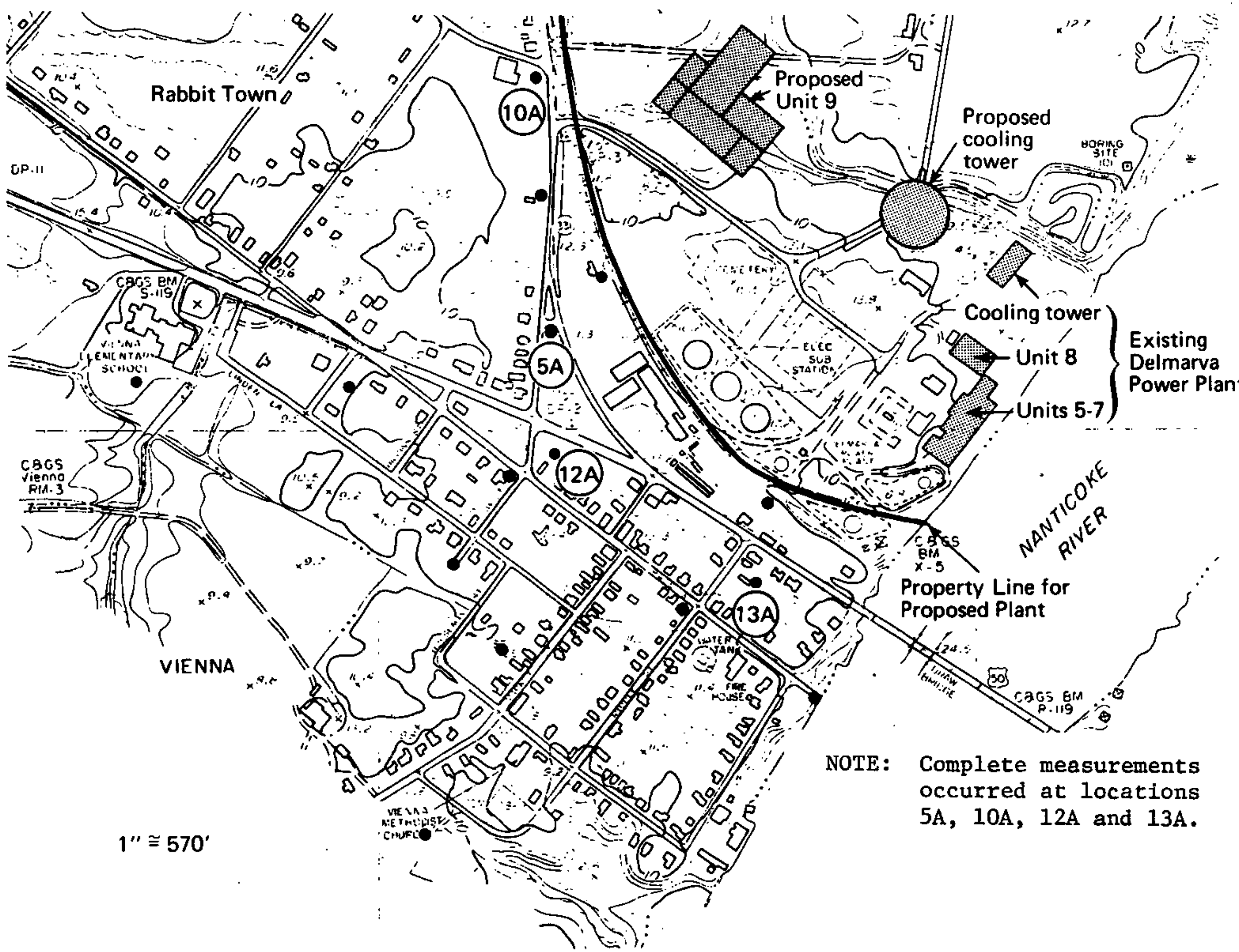
5.1 NOISE AT VIENNA

Table 5-1 gives the estimated total continuous noise from Units 8 and 9 for several operating conditions at four residential locations shown in Figure 5-1. Because Unit 8 is an old oil-fired plant it will be operated infrequently, so the first operating condition shown in Table 5-1 is the most representative noise case. DPL has proposed that when Unit 8 is operated at night the cooling tower fan will be run at one-half its rated speed; this is the second operating condition shown in Table 5-1. Daytime operation of Unit 8 will produce the noise shown as the third operating condition.

State noise regulations generally prescribe a maximum noise level in residential areas of 60 dBA during the day and 50 dBA at night. It can be seen from Table 5-1 that total continuous plant noise may exceed the nighttime residential noise standard at locations 5A and 13A by as much as 2 dBA depending on plant operating conditions.

Noise levels from intermittent noise sources associated with Unit 9 are shown in Table 5-2. The steam venting will occur once for a two or three day period during the construction period. State noise regulations limit construction noise to 90 dBA during the day and 50 dBA in residential areas at night, so it will be necessary to limit steam venting to the daytime. Noise from railroads and auditory warning devices is excluded from State regulation. DPL plans to limit other intermittent noise sources so that total plant noise does not exceed State noise regulations.

An estimate has been made of potential annoyance from continuous plant noise by comparing the projected ambient and plant noise at Vienna to studies conducted in other communities. The ambient noise was measured at the four locations shown in Figure 5-1 and adjusted for the effects of the then operating Units 5 through 8 and Route 50 highway noise. While Route 50 remains in its present location, no noise problems are anticipated because plant noise levels are close to ambient noise levels. If Route 50 is relocated north of Vienna, then noise from the plant is



NOTE: Complete measurements occurred at locations 5A, 10A, 12A and 13A.

Fig. 5-1 Locations for ambient noise measurements and projected noise levels.

Plant Operating Conditions		Time of Day	Total Noise (dBA)			
Unit 8	Unit 9		Location*			
			5A	10A	12A	13A
Off	Operating	Day or Night	50	47	41	49
Operating with cooling tower fan at half speed	Operating	Night	52	49	43	52
Operating	Operating	Day or Night	53	50	44	54
*See Figure 5-1 for locations						

Table 5-1. Noise Levels for Continuous Plant Sources at Four Residential Locations in Vienna

Noise Source	Location			
	5A	10A	12A	13A
Coal handling (without train passby and flyash truck)	45.4	48.8	31.6	31.7
Steam vent	79.1	82.6	75.5	74.1
Train passby (hauled cars)	49.6	55.5	46.7	48.5
Train whistle	77.	85.	74.	70.

Table 5-2. Noise Levels for Intermittent DPL Noise Sources at Four Residential Locations in Vienna.

estimated to be at a level above ambient that has caused sporadic complaints in other communities.

DPL is planning to apply for a variance to the nighttime residential noise standard. It is likely that the variance will be granted, based on the limited potential for annoyance.

The effects of intermittent noise are difficult to assess, but it appears that the train whistle is likely to cause sleep interruption, and that coal handling and train passby could cause sleep disturbance for some individuals. A mitigating approach would be to restrict train operations to daytime hours. The Public Service Commission may impose such constraints even though they are more stringent than State noise regulations.

5.2 NOISE AT ALTERNATIVE SITES

The Deep Branch and Church Creek sites are both large, wooded parcels located in low population areas. Ambient noise levels in the vicinity of both sites are relatively low and characteristic of rural and residential areas. If the plant is located near the center of each site, then the continuous plant noise at the site boundary will range from 41 to 44 dBA, which complies with State noise regulations. This noise level would range from 0 to 11 dB above ambient noise depending on the location, which could lead to sporadic noise complaints by residents. With proper design, shielding by trees could reduce the noise levels by approximately 8 dB, and additional control could be obtained in one direction by using the generator building as a sound barrier for the cooling tower, which is the principal noise source. Under these conditions the noise would be near ambient levels. The annoyance of off-site continuous noise is thus a potential problem but it can be mitigated if care is exercised in plant design. The intermittent noise situation at the alternative sites will be similar to that at Vienna.

5.3 CONCLUSIONS

* Continuous noise in residential areas adjacent to the plant will meet State noise standards when Unit 9 is operated alone at full load. State nighttime noise standards will be exceeded by 2 dBA when Unit 8 is also operating in its proposed nighttime mode with the cooling tower fans at half speed. The standard would be exceeded by 4 dB if the Unit 8 fan speed were not reduced at night.

* No annoyance problems with continuous noise are anticipated while Route 50 remains in its present location. If Route 50 is relocated north of Vienna the continuous plant noise is estimated to be at a level above ambient that has caused sporadic complaints in other communities.

* Intermittent noise due to train delivery of coal and coal handling may cause sleep disturbance for some individuals. The strongest noise source will be the train whistle, which is excluded from State noise regulations.

CHAPTER 6
SOLID WASTE DISPOSAL

6.1 INTRODUCTION

DPL has described plans for waste disposal in the Solid Waste Disposal Plan and in subsequent testimony and stipulations. An assessment of waste disposal impacts by APL is contained in JHU PPSE 8-5 and descriptions of the ground water systems at Vienna and Church Creek are contained in reports JHU PPSE 8-6 and JHU PPSE 8-9, respectively. Modelling of contaminant transport is contained in report JHU PPSE 8-15. It should be noted that the plans for disposal of solid waste and estimates of environmental impacts have evolved substantially over the three years that the Vienna site has been under study. The reasons are that the technology of waste disposal is new and developing rapidly in response to recent legislative and regulatory concerns, and the assessment of environmental impacts is similarly a developing science. DPL initially proposed a disposal approach which at first appeared adequate. Subsequent detailed study by DPL and the Power Plant Siting Program of the characteristics of the waste and features of the disposal site revealed potential contamination problems and extensive uncertainty concerning the possible extent of impacts. Uncertainties concerning the regulatory environment also complicated the analysis. A revised waste disposal plan proposal was arrived at after extensive study and appears to represent a satisfactory and cost effective approach for the areas considered for the siting of this power plant.

6.2 REVISED DISPOSAL PLAN

The two principal high volume wastes that will be produced by the facility are scrubber sludge and flyash, both of which result from treatment of the combustion gases to limit air pollution. The wastes will be blended together to form a damp, soil-like material and disposed of in a landfill at the rate of approximately two-thirds acre-foot per day. The solid waste disposal site will be west of Route 331 as shown in Figure 3-1 and after 30 years the pile will cover 165 acres to a maximum height of approximately 50 feet. A five foot thick layer of fill will be placed under the waste pile to keep it out of direct contact with the ground water, and an impermeable cover will be installed over the waste to eliminate contact with rain water. A layer of soil will be placed over the cover and planted with Kentucky 31 fescue.

An artist's sketch of the general features of the waste pile after 30 years of operation is contained in Figure 6-1. After completion, the grading will route rainfall runoff from completed areas of the waste pile to natural drainage. The emplacement procedure for the waste will be to work in ten successive 16.5 acre tracts. Runoff from the active area will be collected in a lined sedimentation pond and recycled into the scrubber system. Infiltration of rainwater during emplacement will be insufficient to cause the waste pile to saturate so no leachate will result. The entire proposed design should result in a negligible amount of water reaching the ground water or surface waters.

6.3 REGULATORY SITUATION

The solid waste to be disposed of at Vienna is not a "hazardous material" by federal definition because the chemical concentrations in leachate tests performed by DPL were well below the hazardous threshold and because this type of waste is at present specifically excluded from the hazardous category. Therefore, under federal regulations administered by the Environmental Protection Agency (EPA) the waste is a "solid waste" which must not contaminate an underground drinking water source beyond the solid waste boundary or an alternative boundary set by the state. This means that primary (and possibly secondary) drinking water standards must not be exceeded at the boundary.

Code of Maryland Regulations require a permit from the Environmental Health Administration for discharge to the ground water regardless of the material, but the constraints vary depending on the nature of the material. Combustion ash waste is a "Class III designated hazardous substance (DHS)" so it is likely that flyash blended with scrubber sludge will have the same classification. A facility for disposal of such a waste is required to either "contain a DHS in such a manner as to prevent its release into the environment" or "alter the characteristics of a DHS so that it may be released to the environment in a safe and controlled manner."

The interpretation and administration of the various regulations is currently uncertain. At present the EPA is promulgating draft and final regulations for solid waste and hazardous waste management, and Maryland may need to amend its regulations to be in conformance with EPA requirements. It is possible that at least some permit functions could be assumed for an interim period by EPA. In Maryland a reorganization and consolidation of water regulatory functions in the Environmental Health Administration (EHA) has recently occurred. Just prior to the reorganization the Water Resources Administration in consultation with EHA set forth the following criteria for the Vienna waste disposal facility:

1) Primary and secondary drinking water standards must be met at the edge of the waste pile at all depths.

2) The waste shall not be allowed to contact the water table unless data are submitted which prove that this action does not result in a violation of condition 1).

It is possible that a different set of state criteria may be applied when DPL applies to EHA (probably in early 1981) for a permit to discharge to the ground water. The underlying uncertainty pervading this topic is the extent (if any) to which a potential drinking water aquifer should be allowed to be contaminated. The design approach described in section 6.2 attempts to avoid this regulatory uncertainty by almost eliminating discharges.

Discharges to the surface waters from a waste disposal facility are regulated by the State of Maryland. The general criterion is that the waters must be free from substances in concentrations which are harmful to human, animal, plant or aquatic life. The only relevant specific criterion is pH outside of a designated mixing zone but other criteria are likely to be proposed on a case-by-case basis.

In addition to regulation of discharges from the solid waste facility by the Environmental Health Administration and the EPA, it is possible that the Public Service Commission could impose conditions on the siting and operation of the facility to insure that waste disposal is handled safely and economically.

6.4 IMPACT ANALYSIS

The resources at risk from the waste disposal facility are the water table aquifer and the adjacent surface water bodies. The water table aquifer is currently used for private domestic and agricultural purposes, and it is likely that the town of Vienna will soon use the aquifer for municipal drinking water because the presently used deeper aquifer is of poor quality. The general directions of flow for ground water under the disposal site are east and south. The concentration in the ground water at offsite locations of any leachate discharged from the disposal facility will depend strongly on location and specific local features of the ground water system. The adjacent streams (Chicone Creek and Otter Pond Branch) contain a variety of fish species, and major striped bass spawning occurs in the Nanticoke River. The contaminants in the waste pile which, if discharged, are likely to be a problem for drinking water or the local ecology include cadmium, selenium, arsenic, sulfates, chlorides, and total dissolved solids. All of these constituents are also present in the ground and surface water from natural causes or from other human activities. The objective of the impact analysis has been to predict whether the existing levels would be substantially elevated due to releases from the waste disposal area and whether mitigating designs are feasible.

During the three years that the waste is being emplaced in a 16.5 acre tract it will be exposed to rain water. Part of the rainfall will run off and be collected in a lined basin where it will be treated and used as makeup to the scrubber system. There will be no discharge to surface waters except under severe storm conditions. Any overflow which may occur will be discharged by a pipeline to the Nanticoke River. The biological consequences of such infrequent discharges are expected to be insignificant. Analysis indicates that the quantity of rainfall (approximately 18 inches) that infiltrates the active waste pile will not be sufficient to cause leachate from the bottom of the waste pile. This is because the material is partly dewatered before emplacement, so the addition of approximately 18 inches of water to a 45 foot pile of waste does not cause it to saturate.

After each 16.5 acre section is closed and covered with a liner there should be no flows to ground or surface waters because the waste will be isolated from all water sources. A ground water transport study has been performed to illustrate the distribution of leachate if a release should occur due to causes such as a leaky cover. For leachate generation on the order of a few inches per year it is likely that substantial dilution could occur near the edge of the waste pile, but specific predictions of dilution will require more information on the dispersivity of the ground water system. Natural attenuation mechanisms in the soil should further reduce most concentrations. It therefore appears that such releases would result in concentrations near the edge of the waste pile which will meet primary and secondary drinking water standards.

The most important design element of the waste disposal area is the performance and durability of the material selected for the impermeable cover. Artificial membranes, asphalt and clay are all worth consideration, and there are tradeoffs involving cost, reliability, durability, and ease of installation. Specific selection of a liner material should be deferred as long as possible because development of new materials and knowledge about their performance is expanding rapidly due to the recent regulatory impetus for solid and hazardous waste containment.

Regardless of the cover material selected it will eventually deteriorate and become more permeable. It is therefore important to have operational procedures and a monitoring program adequate to protect the cover and detect whether leakage is occurring at a rate requiring maintenance. Safeguards should include:

1) Control of access to the waste pile to prevent damage to the cover.

2) Maintenance of a vegetative cover without deep roots, which could cause penetration of the liner.

3) Inspection of the cover for erosion which would expose the liner to puncture and accelerated aging.

4) Operation of multi-level observation wells near the edge of the waste pile so that leakage can be detected. The collection of additional pre-operational water quality data will be required to assess the temporal variability of the background level of chemicals in the ground water.

Another potential problem with the solid waste disposal area is the generation of dust during operation of the facility. This topic is addressed in section 7.4 of this report.

6.5 ALTERNATIVE SITES

In general the potential problems with solid waste disposal at the alternative sites of Deep Branch and Church Creek are not as extensive as at Vienna, but the nature of the sites is likely to make necessary designs and costs similar to those at Vienna. At both alternative sites there are no public water systems that use the water table aquifer, but it is likely that shallow individual domestic wells are in use. The high water table, low ground elevation and potential for settlement of the waste will require engineering measures to isolate the bottom of the waste pile from the ground water. At Church Creek the Blackwater Wildlife Refuge is approximately 3 miles south and it could be affected by ground water flow or by surface runoff into the Little Blackwater River. A hydrogeology study at Church Creek and preliminary borings at Deep Branch indicate extensive shallow clay which could cause cracking of rigid stabilized waste or underdrains and which would make the prediction of contaminant distribution in the ground water very difficult. For environmental protection the above factors are likely to require a disposal facility design similar to the one proposed for Vienna.

6.6 CONCLUSIONS

* There will be a negligible amount of discharge from the solid waste disposal facility if the following presently proposed design features are included: an impermeable cover over the waste, a base of fill under the waste to prevent contact with the ground water, a lined collection basin for runoff from the active waste emplacement section, and reuse of water from the collection basin for plant processes.

* Details of the design, operation, maintenance, and monitoring of the facility remain to be resolved in subsequent regulatory proceedings.

* A study program during the early stages of use of the waste facility would provide valuable information on whether the prediction of negligible discharge is correct and whether modification of facility operation is necessary.

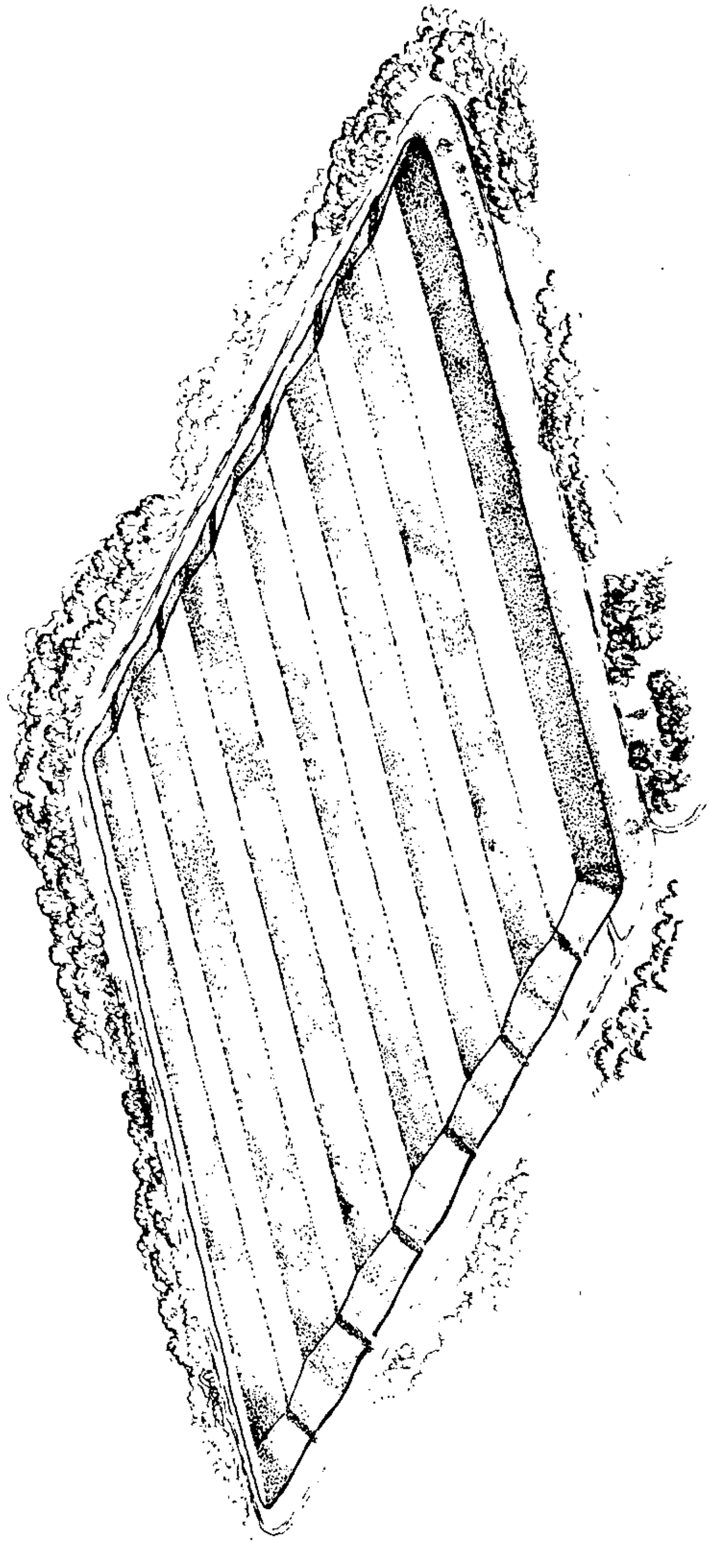


Fig. 6-1 Artist's concept of solid waste disposal area.

CHAPTER 7
DISCHARGES TO THE ATMOSPHERE

The principal discharges to the atmosphere from the power plant occur as salt drift from cooling towers and from the combustion gas scrubber in the stack, as water vapor plumes from the cooling towers, as dust from coal and limestone handling, and as emissions of sulfur dioxide, nitrogen dioxide and total suspended particulates from the stack. For the Vienna site our analysis has included the effects of both the existing Unit 8 and the proposed Unit 9. A detailed discussion of results is contained in reports PPSE 8-3, PPSE 8-13, and PPSE 8-14. Note that DPL has recently changed the proposed cooling tower from a round mechanical draft to a natural draft tower. The effects of both types are described in report PPSE 8-3.

7.1 SALT DEPOSITION

Water from the Nanticoke River will be used for condenser cooling and stack gas scrubbing for Unit 9 at Vienna. The river water at Vienna is brackish, varying in salinity from fresh to approximately 4 parts per thousand. Due to evaporation, salt in the cooling tower basin and the scrubber will be concentrated by factors of 3 and 8 respectively, so that relatively salty water will be emitted as drift from the cooling tower and the stack in addition to the emission of a vapor plume of steam. At Vienna the cooling tower for Unit 8 will also produce salt emissions. At Deep Branch and Church Creek the intake water salinity is higher (10 to 17 parts per thousand) so the quantity of salt emitted would be proportionally higher. We have postulated that at these two alternative sites the concentration factor for the cooling tower would be reduced to a value of 2 to reduce salt emission effects.

A model developed under the Chalk Point Cooling Tower Project has been used to predict salt drift for on-site and off-site locations using ten years of meteorological data. Two types of cooling towers have been studied: the natural draft tower now proposed for Vienna and the round mechanical draft tower previously proposed for Vienna. Either type could be used at the alternative sites. The total predicted salt deposition rate at the plant boundary (which includes the near bank of the river) is shown in Table 7-1 for the natural draft cooling tower at Vienna. The maximum deposition rates occur in the fall; the spring rates range from 1.1 to 2.2 kg/ha-month (1.0 to 2.1 lb/acre-month). On-site deposition rates would be significantly increased by use of a round mechanical draft tower but off-site rates would not be substantially affected by tower choice.

Salt deposition predictions for the alternative sites are contained in report PPSE 8-3. In general, the deposition rates would be higher than at Vienna, but the use of ground water for scrubber makeup would reduce the off-site rate to be comparable to the Vienna rate.

The off-site effects of salt deposition are expected to be modest at Vienna or alternative sites. No significant accumulation of salt in the soil is predicted to occur. The reduction in crop yield at the site boundary for corn and soybeans is expected to be on the order of a few percent. The Chalk Point experiments indicated that for native perennial vegetation leaf damage is likely to occur to dogwood trees. Weathering and corrosion of materials will be similar to that in a region 1 km inland of the ocean coast. On-site salt deposition will cause more extensive damage to on-site vegetation. The new Route 50 bridge proposed to traverse the site is expected to be subject to a deposition rate of about 17 kg/ha-month during the fall season, which will cause some accelerated corrosion.

7.2 VISIBLE PLUME

The water vapor emitted from the cooling tower will be visible as a white plume emanating from the top of the tower. Plume length for the proposed natural draft tower is given in Table 7-2. Use of a round mechanical draft tower would give a lesser instance of long plumes shown in Table 7-3. There will also be a smaller plume from the existing cooling tower for Unit 8.

7.3 FOGGING AND ICING

Report PPSE 8-3 discusses the potential for the originally proposed round mechanical draft cooling tower at Vienna to cause fogging and icing on the planned new Route 50 bridge and report PPSE 8-16 describes a study with a physical model to address part of the problem. DPL's recent decision to change to a natural draft tower eliminates fogging and icing from Unit 9 as a problem at Vienna because the cooling tower plume will be sufficiently elevated to avoid interaction with the highway or bridge. No such problems are expected at the alternative sites regardless of the tower types used.

7.4 AIR QUALITY FROM STACK EMISSIONS

Combustion emissions must meet two different types of air quality standards. The first is that the plant cannot cause the concentration of sulfur dioxide, total suspended particulates and nitrogen dioxide in the publicly accessible area surrounding the plant to exceed fixed values known as National Ambient Air Quality Standards or NAAQS. The second standard is that the combined effect of all new sources of pollution in a region cannot cause concentrations to increase by more than a fixed amount for sulfur dioxide and total suspended particulates. This policy is known as Prevention of Significant Deterioration or PSD. The combined effect of the entire plant (existing Unit 8 and proposed Unit 9) must be considered when applying the NAAQS. For the purposes of PSD the utility receives credit for any sources of pollution removed since August 1977, which in this case includes DPL's closure of Units 5,

TABLE 7-1
ESTIMATED OFF-SITE SALT DEPOSITION FROM VIENNA SOURCES

Direction from Origin	Distance (meters)	Salt Deposition (Kg/Ha-Month)			
		Winter	Spring	Summer	Fall
N	775	5.6	1.9	6.4	15.6
NNE	725	8.8	1.6	5.0	13.0
NE	800	5.3	1.5	4.2	9.5
ENE	750	5.5	1.4	3.5	8.1
E	1500	2.2	1.1	1.7	3.5
ESE	575	9.4	1.7	2.3	10.6
SE	575	8.2	1.7	2.1	10.6
SSE	650	4.7	1.3	2.3	7.8
S	500	7.8	1.5	3.0	15.2
SSW	400	7.3	1.5	3.3	16.2
SW	350	8.6	2.0	4.6	24.1
WSW	350	8.7	2.2	4.8	22.7
W	400	8.5	2.2	5.0	23.9
WNW	475	4.3	1.7	3.9	16.5
NW	650	2.9	1.4	3.4	11.3
NNW	900	2.2	1.3	2.9	6.6

Notes: 1. Plant at full load, 24 hours per day

2. The natural draft cooling tower is the origin of the coordinate system.

Plume Length Exceeded (meters)	% of Time Length is Exceeded			
	Winter	Spring	Summer	Fall
100	90	70	58	78
200	67	49	42	57
500	37	34	36	42
1000	29	28	24	34
3000	13	11	12	18
10,000	5	4	6	8

Table 7-2. Visible Plume for Unit 9 Natural Draft Cooling Tower

Plume Length Exceeded (meters)	% of Time Length is Exceeded			
	Winter	Spring	Summer	Fall
100	96	73	63	81
200	78	50	44	60
500	37	24	22	32
1000	20	14	7	16
3000	5	3	2	5
10,000	2	1	0	2

Table 7-3. Visible Plume for Round Mechanical Draft Cooling Tower

6 and 7 in early 1980. At present NAAQS are administered by Maryland under authority delegated by the Environmental Protection Agency (EPA), and PSD is administered by EPA.

Meteorological and ambient air quality data for the area around Vienna have been collected and a model has been used by APL to predict air quality effects for 3-hour, 24-hour and annual concentrations, depending on the specific regulatory requirements. The applicable maximum predicted concentrations for stack emissions from the proposed 600 MWe plant are shown in Tables 7-4 and 7-5 along with the appropriate standard which must be met. It can be seen that NAAQS are expected to be met at Vienna or the alternative sites. The total available PSD increment is also not exceeded at any of the sites by stack emissions alone, but for sulfur dioxide much more of the increment is used at the alternative sites because the effect of shutting down Units 5, 6 and 7 at Vienna is negligible at the alternative sites. The analysis of particulates does not include fugitive dust emissions, which are addressed in Section 7.5. It should be noted that the fraction of the PSD increment that will be available to DPL's facility will be determined by EPA in a separate regulatory proceeding.

A detailed discussion of air quality effects from stack emissions is contained in report PPSE 8-13.

7.5 FUGITIVE DUST

Fugitive dust emission at a power plant site is particulate emission from sources other than stacks. Fugitive dust can be generated from power plant operations such as those involving transportation, handling and open storage of coal, limestone and waste material. In addition dust can be resuspended from roads and fields by the action of wind and vehicular traffic. Dust emissions can be controlled by mechanical and chemical techniques, e.g., by the use of enclosed and filtered handling areas and by chemical dust suppressants.

The proposed 600 MWe Unit No. 9 at Vienna will burn approximately 1,500,000 tons of coal each year if operated at 68% capacity factor. This operation will involve handling coal delivered by rail or barge. Two coal piles will be maintained: a 3-day active coal pile of 12,500 tons and a long-term emergency pile of 420,000 tons, a 90-day supply. Scrubbing of flue gases will use 140,000 tons of limestone per year. This material will be delivered every 20 days and be handled through an active pile of 7,600 tons. The waste products, flyash from burning coal and sludge from the scrubber, will be mixed and transported to a nearby waste disposal area at the rate of 455,000 tons/year. A complicating factor at Vienna is the fact that Route 50 may be rerouted through the proposed plant expansion area so that the highway will be adjacent to the coal handling facilities.

Table 7-4. Applicable Maximum Predicted Concentrations and National Ambient Air Quality Standards (NAAQS) for Stack Emissions Only

Location	Contaminant	Period	------Compare------ Predicted Max. Plant Plus Ambient	EPA Standard
Vienna	Sulfur Dioxide	Annual	29	80
		24-hour	295	365
		3-hour	984	1300
	Total Suspended Particulates	Annual	50	75
		24-hour	65	150
	Nitrogen Dioxide	Annual	36	100
Alternative Sites	Sulfur Dioxide	Annual	16	80
		24-hour	92	365
		3-hour	452	1300
	Total Suspended Particulates	Annual	49	75
		24-hour	63	150
	Nitrogen Dioxide	Annual	31	100

Note: Concentrations in $\mu g/m^3$.

Table 7-5. Applicable Maximum Predicted PSD Increments and Standards for Stack Emissions

			Compare	
Location	Contaminant	Period	Predicted Max.	EPA Standard
Vienna	Sulfur Dioxide	Annual	.9	20
		24-hour	25.	91
		3-hour	125.	512
	Total Suspended Particulates	Annual	.2	19
		24-hour	2.3	37
Alternative Sites	Sulfur Dioxide	Annual	5.	20
		24-hour	70.	91
		3-hour	430.	512
	Total Suspended Particulates	Annual	.3	19
		24-hour	3.5	37

Note: Concentrations in $\mu g/m^3$.

National Ambient Air Quality Standards (NAAQS) limit off-site concentrations of total suspended particulates (i.e., plant contribution plus ambient background) to an annual average level of 75 $\mu g/m^3$ and a 24-hour average level of 150 $\mu g/m^3$. This is a secondary standard (not health related). NAAQS is administered by the State of Maryland under authority delegated by the U. S. Environmental Protection Agency (EPA).

The Prevention of Significant Deterioration (PSD) policy poses more restrictive limitations. For the vicinity of Vienna, designated as a Class II area for PSD considerations, incremental increases over concentrations in existence as of August 7, 1977 should be less than 37 $\mu g/m^3$ averaged over 24-hours and less than 19 $\mu g/m^3$ on an annual average basis. At present, EPA retains regulatory authority in the PSD permitting process for facilities in Maryland. EPA has the responsibility for approving the modeling assumptions, emission source terms and locations at which standards are to be applied. It is not possible to anticipate with certainty how the EPA will choose to compare projected fugitive dust concentrations at Vienna with PSD standards.

Based on the best available information, we have assumed for this analysis that NAAQS and PSD standards will be applied on the near edge of proposed Route 50 bypass and on the near bank of the river.

For rail delivery of coal and subsequent handling operations, report PPSE 8-14 (still in preparation) will provide estimates of potential dust source emissions, effectiveness and costs of control technology and predicted dust concentrations at downwind locations using an EPA model. The cases considered are for worst case meteorological conditions selected from one year of hourly meteorological data and/or for representative high values of ambient data from several sites in the state. The control measures modelled are listed in Table 7-6. Some controls as indicated in the table have been added beyond those listed in DPL's applications and testimony. The highest concentrations are predicted to occur at locations on the river bank and the proposed highway, and the principal dust sources are the coal storage piles, the rail car dumper, and stackout (transfer of coal from the conveyor to the pile).

Based on the above approach the following results have been obtained for Vienna:

* It is likely that the NAAQS level of 150 $\mu g/m^3$ will not be exceeded with the controls listed in Table 7-6 or with some minor variation of them.

* The PSD standard of 37 $\mu g/m^3$ is predicted to be exceeded with the controls currently listed in Table 7-6. It is not clear that EPA will apply PSD in the locations assumed. If it does, then additional controls or plant redesign are feasible to reduce emissions below the standard.

TABLE 7-6. FUGITIVE DUST SOURCES AND CONTROL MEASURES

DUST SOURCE	EMISSION FACTOR (LBS/TON)	CONTROL EFFICIENCY (%)	CONTROLS ENUMERATED IN DPL APPLICATIONS AND TESTIMONY	ADDITIONAL CONTROLS MODELED BY APL
COAL HANDLING				
Rail Car Dumper	.04	95.	Dumper House/Chem. Wet Suppression	Dumper House Doorway Curtains
Barge Unloader	.096	80.	None	Chem. Wet Suppression
Convey/Transfer				
Dumper House (2 Transfers)	.015	99.5	Enclosure & Dust Collection (Bag House)	
Transfer House				
Rail to Storage (5 Transfers)	.038	99.5	Enclosure & Dust Collection (Bag House)	
Barge to Storage (5 Transfers)	.038	99.5	Enclosure & Dust Collection (Bag House)	
To Boiler House (5 Transfers)	.038	99.5	Enclosure & Dust Collection (Bag House)	
Barge House (3 Transfers)	.023	99.5	Enclosure & Dust Collection (Bag House)	
Boiler House (4 Transfers)	.03	99.5	Enclosure & Dust Collection (Bag House)	
Coal Stackout				
Rail Unloading	.0092	75.	Telescopic Chute & Dust Suppression Carryover	Chem. Wet Suppression at Stackout
Barge Unloading	.0092	75.	None	Chem. Wet Suppression at Stackout
Coal Pile Handling Traffic	.13	60.	None	Carryover from Chem. Wet Suppression at Stackout
Reclaim from Pile	.011	99.	Enclosure & Dust Collection (Bag House)	
Wind Erosion, Dead Pile	.018	95.	Chemical Crusting Agent	Chemical Tarping Agent
Wind Erosion, Active Pile	.018	80.	None	Carryover from Chem. Wet Suppression at Stackout
LIMESTONE HANDLING				
Rail Car Dumper	.02	95.	Dumper House/Chem. Wet Suppression	Dumper House Doorway Curtains
Convey/Transfer (5 Transfers)	.019	99.5	Enclosure & Dust Collection (Bag House)	
Stackout	.0046	75.	Telescopic Chute & Dust Suppression Carryover	Chem. Wet Suppression at Stackout
Handling Traffic	.065	60.	None	Carryover from Chem. Wet Suppression at Stackout
Reclaim from Pile	.0053	99.	Enclosure & Dust Collection (Bag House)	
Wind Erosion	.0089	80.	None	Carryover from Chem. Wet Suppression at Stackout
FLYASH HANDLING				
Pneumatic System Exhaust	N/A	100.	Pneumatic Transfer & Dust Collection	Recirculation of System Discharge Back to Electrostatic Precipitator
WASTE HANDLING				
Waste Loading	0.0	100.	None	Waste is Wet When Loaded
Haul Road Traffic (Paved)	7.	85.	Paving	Regular Road Washing
Haul Road Traffic (Unpaved)	16.	50.	Watering	

At the alternative sites there should be no difficulty in meeting NAAQS or PSD standards because the site areas are larger.

Dust from barge delivery of coal at Vienna and at alternative sites has not been studied in detail because definition of the regulatory boundaries is uncertain and because the capability for barge delivery is not critical to the suitability of the sites. It is likely that if a problem does develop in meeting a fugitive dust standard due to barge delivery, it will be equally severe at any site without a sufficiently large restricted unloading zone.

7.6 HEALTH EFFECTS

Two pathogenic micro-organisms whose growth could be enhanced by cooling towers are presently receiving intensive national study. The bacterium _Legionella pneumophila_, which causes Legionnaires' disease and Pontiac fever, and the amoeba _Naegleria fowleri_ which causes meningoencephalitis are both naturally occurring organisms for which the warm humid environment within cooling towers and condensers may provide excellent habitat. The principal concern for these organisms with respect to cooling towers is that the tower provides a mechanism for aerosolization and possible disease transmission. For Vienna and the alternative sites, however, the salinity of the make-up water may limit the growth of these organisms. In addition, periodic chlorination or other treatment may provide effective control of these organisms. At present the threat to public or occupational health is speculative. Much more information should be available to decide whether any control measures or monitoring programs are necessary by the time the plant begins to operate in 1987.

7.7 CONCLUSIONS

* The off-site effects of salt deposition on plants and structures are expected to be modest.

* Analysis of the potential problems with fogging and icing of the proposed Route 50 bridge from the plume of a round mechanical draft cooling tower has not been completed because of DPL's recent change to a natural draft tower. Fogging and icing will not be a problem with the natural draft tower.

* All air quality standards can be met for plant stack emissions from a 600 MWe plant with the proposed design and emission control factors.

* It is likely that fugitive dust emissions will not exceed National Ambient Air Quality Standards if suitable controls are used. Additional controls may be necessary to meet PSD standards.

* A decision on the need for control measures or a monitoring program for pathogenic micro-organisms in the cooling tower basin and drift should be deferred until the start of plant operation.

CHAPTER 8
AQUATIC IMPACTS

Aquatic impacts due to a power plant can arise from the intake of cooling water, the discharge of heat and chemicals, increased turbidity due to runoff and dredging, and the destruction of bottom habitat. In this section the estimated impact of water intake on striped bass spawning at Vienna is described first because of the commercial and recreational importance of striped bass and because the Nanticoke River in the general vicinity of Vienna is an important striped bass spawning ground. Other aquatic impacts are then described, and a comparison is made with the alternative sites. A detailed description of aquatic impacts is contained in reports PPSE 8-1 and PPSE 8-11.

8.1 EFFECT OF WATER INTAKE ON STRIPED BASS SPAWNING

The Nanticoke River in the vicinity of Vienna is one of the major striped bass spawning grounds in Maryland. It is estimated that the Nanticoke contributes approximately 12% of the striped bass production in Maryland waters.

Water withdrawal rates by the plant will vary seasonally. For normal operation during the spawning season Unit 9 will withdraw 17.6 cubic feet per second (cfs) of water from the river for cooling and scrubber operation, and approximately 5.4 cfs of water will be returned to the river. During the spawning season fish eggs and larvae are present in the river water, and any such organisms which are entrained (drawn into the plant) in the cooling water will be killed. The design for Unit 9 will substantially reduce entrainment relative to the effects of older units at Vienna (retired in 1980) by using a cooling tower to reduce the volume of cooling water needed and by using a specially slotted intake screen known as a Johnson screen to limit the capture of eggs, larvae, and juvenile fish. Existing Unit 8, which uses a cooling tower, will also be modified to use the slotted screen intake.

In report PPSE 8-1 it is estimated that average annual reduction in striped bass eggs and larvae due to entrainment and impingement (damage on the intake screen) will be 2% for Unit 9, and that the effect on the resulting adult population spawned in the Nanticoke will be a reduction of less than 4% given stock sizes in the range that have occurred in recent decades.

Since the entrainment from the recently decommissioned Units 5, 6 and 7 was considerably greater than from existing Unit 8 and proposed Unit 9, the net effect of the decommissioning of Units 5-7, modification of Unit 8 and start up of Unit 9 will be a reduction in damage to eggs and larvae. Therefore, there is no likelihood that Unit 9 will cause a major change in the viability of the Nanticoke River striped bass population.

The estimate of entrainment/impingement loss is based on a simple model using ichthyoplankton data collected by the Maryland Fisheries Administration from 1954 through 1978, by the Chesapeake Bay Institute in 1978, and by consultants for DPL in 1978 and 1979. The database is unusually extensive for such an evaluation and has allowed observed effects of the yearly variability of spawning to be included in the analysis.

The use of a 1 mm slotted fine mesh intake screen (also known as a Johnson screen or profile wire screen) appears to be the best available technology for this particular site because of its effectiveness in reducing entrainment and impingement and its demonstrated operational capability. DPL has supported laboratory and field tests of the screens, which appear to be almost 100% effective in excluding eggs and larvae larger than 10 mm. By DPL's assessment the screens are also less expensive than the normal travelling screen intake.

The estimate of the effects of entrainment/impingement of eggs and larvae on the resulting adult population and fisheries harvest is based on a recently completed analysis of fisheries data contained in report PPSE T-14 and summarized in report PPSE 8-1. A 4% reduction in the adult Nanticoke population would result in a reduction in harvest due to spawning in Maryland waters of approximately 0.5% because the Nanticoke is responsible for approximately 12% of the striped bass production in Maryland. Overall, the average harvest by weight of striped bass spawning in Maryland waters is estimated to be approximately three times the actual commercial harvest in Maryland waters. The actual commercial harvest is believed to be higher than the reported landings by an unknown amount. The loss to the commercial and recreational fisheries (in pounds) due to entrainment can be estimated using the following expression:

average reported commercial harvest from Maryland waters in pounds	X	ratio of true commercial harvest to reported commercial harvest	X (3)	X (.005)

In the period 1960-1975 the average reported commercial harvest from Maryland waters (Maryland plus Virginia Potomac) was 4.6 million pounds, which would give an annual loss in pounds of 69,000 X U, where U is the under-reporting factor. Since 1975 the harvest has been very much smaller and the loss in pounds would be correspondingly smaller. The degree to which commercial harvests are under-reported remains unresolved.

8.2 OTHER INTAKE AND DISCHARGE EFFECTS

Entrainment and impingement of other organisms in the river can also occur. These effects are discussed in PPSE 8-11. No measurable decline in densities of phytoplankton and zooplankton is expected because of the relatively low intake volume and the high reproductive rates of these organisms. Entrainment/impingement of other fish eggs and larvae is expected to be relatively insignificant compared to striped bass because spawning of the other species is not as concentrated in the vicinity of Vienna. Impingement of juvenile and adult fish is not expected to be a problem because of the relatively low screen approach velocity of .35 ft/sec.

The discharge of heated water from the cooling system will cause elevated water temperatures in the immediate vicinity of the discharge point. Report PPSE 8-10 contains predictions of the thermal plume for Units 8 and 9. As an example, during the winter .023 acres of surface water will have a temperature greater than 2° F above the ambient water temperature. As discussed in report PPSE 8-11, the thermal impact of Unit 9 is likely to be negligible because of the small quantity of heat discharged.

A frequent source of chemical contamination in power plant discharges is corroded copper from the condenser. DPL has indicated that titanium is its preliminary choice of condenser material but that copper alloy condensers are still being considered. The relative features of copper alloy and titanium condensers are discussed in PPSE 8-4 and PPSE 8-11. From an environmental point of view, titanium is a preferable material because of its superior corrosion resistance and low toxicity to biota. The cost comparison of titanium and copper alloy condensers is based on several factors that are quite uncertain. The initial cost of titanium condensers is high but they are expected to last the life of the plant, whereas copper alloy condensers have greater corrosion and are likely to require replacement during the plant lifetime. The actual rate of replacement for copper condenser tubing is uncertain because there is little information on failure rates in brackish closed cycle cooling systems and because experience in fresh and marine systems exhibits a wide range of corrosion rates. In addition, the prices of copper and titanium are subject to fluctuation so that the future purchase price of either condenser system is uncertain. Taking these factors into account, there is no cost difference discernible at this time among the various condenser alternatives. The use of a titanium instead of a copper alloy condenser material therefore appears preferable because the environmental impact is less and cost is comparable.

Another frequent source of chemical contamination in power plant discharges is the use of biocides (usually chlorine) to control biofouling. DPL currently plans to rely on the natural abrasiveness of the river's suspended solids loading and the fluctuation in river salinity to maintain proper condenser cleanliness. The existing units with once-through and cooling tower systems have been successful in operating in this fashion, but they use different condenser materials and have been operated as peaking units, so the experience is not directly comparable. If DPL were to use titanium condensers for Unit 9, it is more likely that some form of biocide may be required, as described in report PPSE 8-11.

If chlorination is required, DPL plans to control chlorine discharges by shutting off the cooling tower blowdown during and possibly after chlorination to allow natural degradation to reduce the concentration of biologically active chemicals. Space will also be left for the installation and operation of chemical dechlorination equipment. As discussed in PPSE 8-4 and PPSE 8-11, the discharge of chlorination products could be harmful to biological systems. However, the use of blowdown retention and dechlorination should allow the effective control of total chlorine residuals to a safe level.

In addition to the chemical effects directly connected with the cooling system, Unit 9 will produce a number of waste streams from floor drains, demineralizer regeneration, boiler cleaning and blowdown, and site runoff including runoff from the limestone and coal piles. DPL plans to collect and treat these waste streams. The sludge from the waste treatment process will be disposed of with the scrubber sludges and the final waste stream will be used as makeup to the scrubber or cooling tower. When the plant is not operating the discharge will be directly to the river through the blowdown discharge system. Runoff from the active portion of the solid waste disposal area will be collected in a lined basin and used as makeup to the scrubber system. Overflow to the river will occur only under extreme storm conditions. The concentrations of the infrequent discharges to the river from the wastewater treatment system and the solid waste disposal area are not expected to be high enough to have any significant effect.

8.3 EFFECTS OF RUNOFF AND DREDGING

Water-sediment runoff from construction activities will include surface drainage and dewatering effluents from excavations. Dredging will be required to deepen the intake/discharge area, to construct the barge unloading facility, and possibly to maintain the channel of the Nanticoke River. These topics are discussed more fully in report JHU PPSE 8-11. The sole long term aquatic impact of these activities will be the loss of a small area of benthic habitat in the intake/discharge area. The sediments in this area are unsuitable for most macrobenthic organisms so the loss is expected to be inconsequential. The principal short-term effects will be a localized increase in turbidity. If dredging is precluded during the striped bass spawning period (April through July), then with proper sediment and erosion control procedures it is unlikely that construction and maintenance dredging activities will adversely affect local biota in any perceptible fashion.

8.4 EFFECTS AT ALTERNATIVE SITES

At Vienna the principal aquatic impact is predicted to be a reduction of the adult population of striped bass due to cropping of eggs and larvae in the spawning area. At the alternative sites of Deep Branch and Church Creek this effect would not occur because there is no significant or concentrated spawning activity at the intake/discharge locations of Roaring Point and Taylors Island. Adjacent oyster bars at both locations could be affected to some extent due to temporarily increased turbidity from dredging during construction of the intake and discharge structures and pipeline. Among the options for coal delivery to the Church Creek site the choice of dredging Fishing Creek and South Branch would disrupt several natural oyster bars because of the extensive dredging required; shipment through the Cambridge Marine Terminal would have a minimal aquatic impact. The localized alterations in water movement patterns due to discharges and structures could have some effect on the early life stages of shellfish. A more detailed study of local hydrology and shellfish distributions would be necessary to address this situation.

8.5 CONCLUSIONS

* The use of a cooling tower and a helically wound fine mesh Johnson screen with 1 mm slot size will control the direct annual entrainment/impingement loss of striped bass larvae in the Nanticoke River to approximately 2%. The effect on the resulting adult population spawned in the Nanticoke will be a reduction of less than 4% given stock sizes in the range that have occurred in recent decades. There is no likelihood that this loss will cause a major change in the viability of the Nanticoke River striped bass population.

* Entrainment/impingement impacts on other species is expected to be relatively insignificant.

* Impacts due to chemical discharges will be negligible if DPL uses titanium condensers, does not chlorinate and treats and reuses its waste streams as proposed. If chlorination is necessary, dechlorination can limit discharges to acceptable levels. Use of copper-nickel condensers would result in some local impacts to biota.

* The prevention of dredging during the striped bass spawning season (April through July) would provide protection from the effects of increased turbidity.

CHAPTER 9
LAND USE AND SOCIO-ECONOMIC IMPACTS

A detailed description of land use and development trends in Dorchester and Wicomico Counties is contained in report PPSE 8-12. Report PPSE 8-7 gives predicted socio-economic impacts at Vienna and alternative sites. This chapter presents a summary of the detailed reports.

9.1 DEVELOPMENT TRENDS AND COMPATIBILITY WITH LAND USE PLANS

The sites of Vienna and Church Creek are located in Dorchester County and the site of Deep Branch is located in Wicomico County. Wicomico County is growing more rapidly than Dorchester County, but there is a great degree of similarity in existing land use patterns in the immediate vicinity of the three sites under consideration. The area around each site is predominantly rural. The Vienna area is more highly developed within one mile of the center of the three sites because of the proximity of the town of Vienna. Approximately 533 people reside within one mile of the center of the Vienna site, 160 within one mile of Deep Branch, and 51 within one mile of Church Creek. The Church Creek area is more highly developed within a six mile radius because of its proximity to Cambridge.

There has been only a small amount of new residential development near each site over the past several decades. The Church Creek area is expected to develop more rapidly than the area around Vienna or Deep Branch in the 1980 to 1990 period because of its proximity to Cambridge. However, even by 1990, the area in the immediate vicinity of Church Creek can be expected to remain primarily rural. Residential development in the Vienna and Deep Branch areas will be scattered and more limited than around Church Creek.

The Wicomico County economy has grown more rapidly than that of Dorchester County in the past and is expected to do so in the future. Manufacturing employment is clustered around the Salisbury and Cambridge areas.

The proposed expansion of Delmarva Power's facility at Vienna is generally consistent with Dorchester County's comprehensive plans. Power plant development at Church Creek or Deep Branch would be inconsistent with the present land use policies of Dorchester and Wicomico Counties, which call for these areas to remain rural in character with only limited residential development recommended. It is possible for the State to override local zoning regulations in the siting of a power plant. The siting process has several opportunities for local input but final decision-making authority is retained by the Public Service Commission.

9.2 FISCAL, LABOR AND HOUSING IMPACTS

An economic and fiscal impact model developed for the Maryland Department of Natural Resources by Alan Mallach/Associates and Rogers and Golden, Inc. was used to estimate the employment, income, housing, population, and fiscal effects resulting from the proposed construction of a 600 MWe coal-fired power plant at Vienna and alternative sites. The number of outside hires that change their place of residence and move into the local area during the construction phase is the most important factor affecting potential impact.

The construction and operation of a power plant generates tax revenue from property taxes on the new plant, income taxes on the wages of the workers, sales taxes on the increased economic activity, etc. Expenditures of various jurisdictions are also increased to provide services such as schooling for the children of employees who take up residence in the local area. The net fiscal impact (revenues minus expenditures) for a plant at Vienna is shown in Table 9-1 for several jurisdictions. The predominant feature is that Dorchester County will receive a net fiscal benefit of approximately 4.8 million dollars per year (in 1978 dollars) over the expected 30 year operating life of the plant. All jurisdictions will experience a positive net fiscal benefit during the construction and operation periods except for a projected $6,300 deficit for Salisbury during the construction period. Fiscal impacts for a plant located at the alternative sites of Church Creek or Deep Branch are shown in Tables 9-2 and 9-3.

The estimated number of workers required to construct and operate the Vienna plant is shown in Table 9-4. Some of the workers hired from outside the local area will relocate to the general vicinity of the construction site, and some of them are likely to live in Dorchester County. The model estimates that approximately 30% of the relocating workers will reside in Dorchester County. The number of additional jobs generated in the county is shown in Table 9-5. The 300 county jobs generated during the peak year represents 2% of the employed work force and 20% of the number of county unemployed in 1977. Although some of these jobs would be filled by workers shifting from their existing occupations to higher paying jobs at the construction site, the number of these workers is likely to be too small to adversely affect the labor supply of existing industries.

A prediction of housing and population effects resulting from the immigration of workers and their families is shown in Table 9-6. The projected demand for 48 housing units in 1985 is expected to represent 14% of the available housing vacancies.

The impacts on the local labor and housing markets of locating the plant at Church Creek or Deep Branch would not be significantly different from those associated with the Vienna site.

Table 9-1
Net Fiscal Impacts for
Plant at Vienna

Jurisdiction	Total During Construction	Yearly Total During Operation
Dorchester Co.	$ 261,600	$ 4,840,700
Cambridge	15,000	1,700
Vienna	700	500
Wicomico Co.	114,000	27,000
Salisbury	(6,300)	3,500
Maryland	3,320,500	461,500

Table 9-2
Net Fiscal Impacts for
Plant at Church Creek

Jurisdiction	Total During Construction	Yearly Total During Operation
Dorchester Co.	$ 361,000	$ 4,871,000
Cambridge	15,800	12,800

Table 9-3
Net Fiscal Impacts for
Plant at Deep Branch

Jurisdiction	Total During Construction	Yearly Total During Operation
Wicomico Co.	$ 356,000	$ 3,261,000
Salisbury	(5,700)	5,900

Table 9-4
Workers Required to Construct and Operate Proposed
Vienna Power Plant
1983-1988

Year	Outside Hires	Local Hires	Total Hires
	Construction Period		
1983	57	29	86
1984	468	121	589
1985	879	126	1005
1986	737	98	835
1987	348	96	444
	Operating Period		
1988[1]	30	70	100

[1]First full year following start of plant operations. The number of workers required to operate Vienna 9 is expected to remain constant at the 1988 level during the life of the plant.

9.3 TRANSPORTATION IMPACTS

The proposed 600 MWe power plant will require the shipment of 1,500,000 tons of coal per year for a 68% capacity factor. Rail shipment by unit trains of 100 cars would require 3 to 4 round trips per week, and barge shipment would require 3 to 8 barge tows per week. DPL has not made a decision on which mode of shipment to use, and there are numerous reasons to have both modes available over the life of the plant.

A map of the rail lines involved is shown in Figure 9-1. For siting at Vienna, a segment of the Cambridge to Seaford line would require upgrading and the abandoned Vienna to Hurlock line would be returned to service. For the Church Creek site a four mile rail spur would be constructed to the Cambridge to Seaford line several miles east of Cambridge, and that line would require upgrading to Seaford. For Deep Branch a twelve mile rail spur would be constructed to the Hebron to Salisbury line, which would require upgrading.

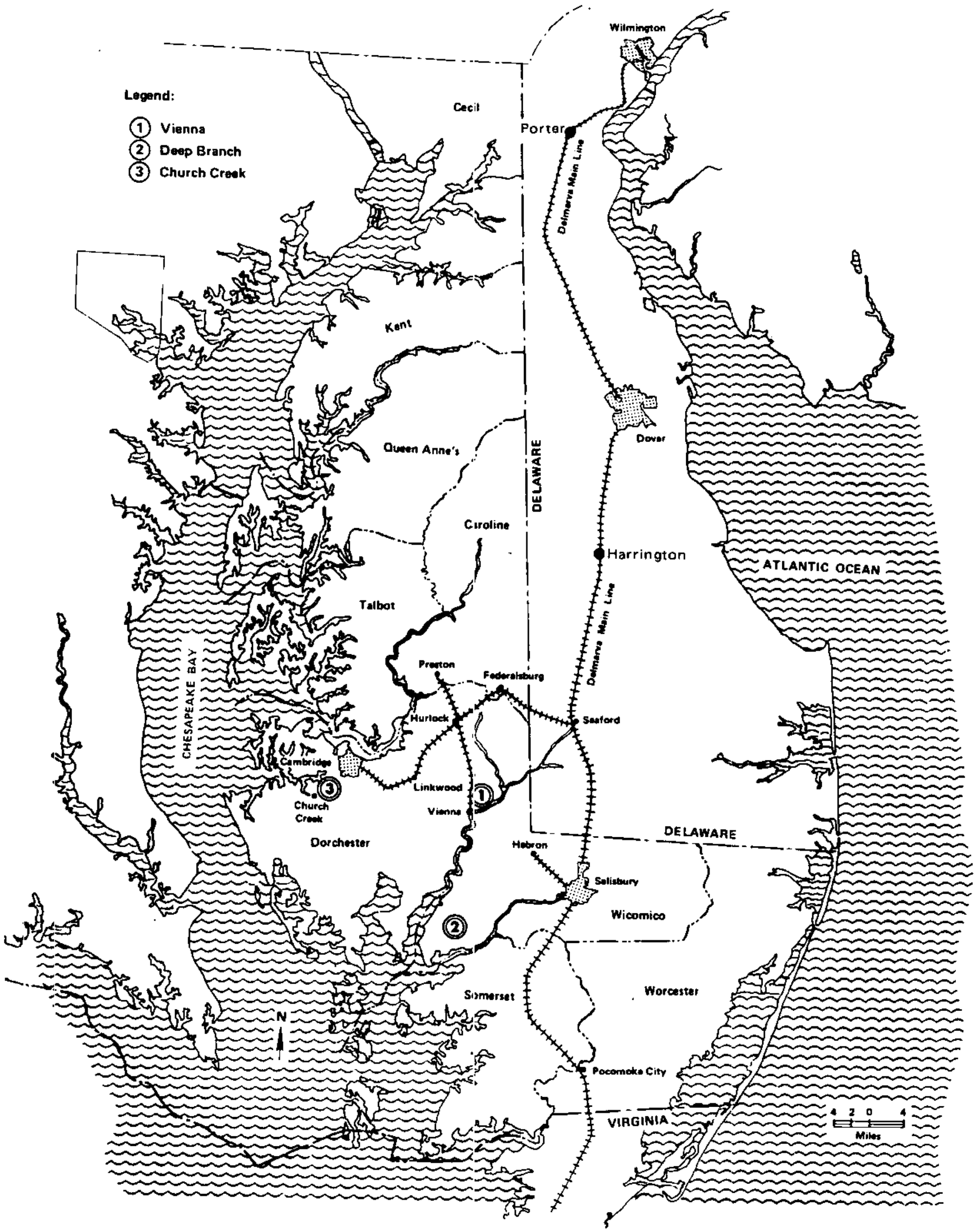


Figure 9-1 Rail Lines Affected by Proposed Power Plant Sites
Delmarva Peninsula

Table 9-5
Jobs Generated by Vienna Power Plant in Dorchester County
Direct and Secondary
1983-1988

	At Construction Site				
Year	County Residents	Immigrants[1]	Subtotal	Secondary Jobs[2]	Total
		Construction Period			
1983	13	2	15	24	39
1984	55	21	76	136	212
1985	57	55	112	247	359
1986	44	37	81	112	193
1987	43	13	56	21	77
		Operating Period			
1988[3]	32	9	41	3	44

[1]Number of workers hired from outside the local area who reside in Dorchester County as of the given year. Excludes employees who stay in motels during the week and commute to their homes on weekends.

[2]Filled by county residents.

[3]First full year following start of plant operations. The number of jobs generated by the power plant is expected to decline to 41 by 1990 and then stabilize for the remainder of the operating period.

Any operating deficit on the branch rail lines involved is presently covered by a combination of federal and local subsidy. The viability of these lines may depend upon whether the State assumes a significant fraction of the deficit when the federal subsidy ends in October 1981. The Maryland Department of Transportation has made provision in its FY 1982 budget request to assume 70% of the operating deficit for that year subject to the approval of the Govenor and the Maryland general assembly. No decision has been made for subsequent years. The projected carload volume for a 600 MWe coal plant should be more than sufficient to assure the financial viability of whatever

Table 9-6
Total Housing Demand, Population and School Children
Estimated by Year from Proposed Vienna Power Plant
1983-1988

Year	Immigrating Workers	Housing Demand	Cumulative Population	Additional School Children: Grade School	High School	College	Total[2]
		Construction Period					
1983	2	2	5	1	0	0	1
1984	21	19	58	7	3	1	11
1985	55	48	151	19	8	2	29
1986	37	33	103	13	5	1	20
1987	13	11	35	4	2	0	7
		Operating Period					
1988[1]	9	8	25	3	1	0	5

[1] First full year following start of plant operations. Total housing demand, population, and school children during 1989 and the remainder of the operating period are expected to remain constant at 1988 levels.

[2] Total may not equal sum of components due to rounding off.

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branch lines are involved. Because of the importance of the Cambridge to Seaford rail line to the Dorchester County economy, the benefits of rail transport are greatest for the Church Creek site and least for the Deep Branch site.

The impacts associated with construction and operation of a rail spur to the Deep Branch or Church Creek sites are discussed in section 9.5. For all three sites there may be localized impacts in the vicinity of the rail lines from noise, coal dust, and interference with highway traffic near at-grade highway crossings. The adverse effects of rail transport are expected to be least for the Vienna site and greatest for the Deep Branch site.

Local economic benefits of transporting coal by barge to Vienna or the alternative sites are expected to be much smaller than if rail is used. The benefits would be approximately the same at all three sites if the Fishing Creek barge option is selected at Church Creek. The economic benefit at Church Creek would be slightly greater if the Cambridge Marine Terminal were used because of the increased viability of the terminal.

The adverse effects of barge transport vary among the sites. At Vienna and Deep Branch no channel dredging of rivers would be required, but the barge traffic may interfere to some extend with commercial fishing in the Nanticoke River for the Vienna site and with recreational and commercial boating in the Wicomico River for the Deep Branch site. At the Church Creek site greater impacts would occur because of congestion if the Marine Terminal were used and because of dredging of Fishing Creek if that option were chosen for docking.

In summary, although the net effects to the local area vary with site and transportation mode, the net benefits from coal transport are likely to be largest for the Vienna site.

9.4 TRAFFIC IMPACTS

Traffic impacts on highways resulting from constructing the power plant have been examined in detail for the 1985 peak construction year for the Vienna site, and to a lesser degree for the alternate sites at Church Creek and Deep Branch. This analysis reveals that the incremental traffic generated by the construction workers would result in an unacceptable level of traffic congestion at the intersection of U. S. Route 50 and Route 331 during the summer months in 1985, but during the rest of the year traffic flow through this intersection would be adequate. The State Highway Administration of the Maryland Department of Transportation has recommended upgrading of the intersection to alleviate this traffic congestion in the event that the Vienna site is approved. For the alternative sites a preliminary analysis indicates a level of impact on Quantico Road near Deep Branch which would require further study if the site is considered in detail.

9.5 TRANSMISSION LINE, PIPELINE AND RAIL CORRIDORS

An advantage of the Vienna site is that existing transmission line and rail corridors are available and that the water intake will be from the adjacent Nanticoke River. At the Church Creek and Deep Branch sites new rights-of-way will be required for transmission line, pipelines and rail lines as shown in Table 9-7. The approach used to identify corridors for these rights-of-way is described in this section.

Transmission lines create impacts during both construction and operation. The 250 foot wide right-of-way must be cleared of tall trees and some other vegetation during construction and a cleared area must be maintained during operation of the line. Typically, a 15 to 20 foot wide

Table 9-7. Rights-of-Way Required for Alternative Sites

Site	Rights-of-Way Length in Miles		
	Transmission Line 250 foot width	Pipeline 100 foot width	Rail Spur 70 foot width
Church Creek	17	11	4
Deep Branch	8	6	11

access road will be constructed along the right-of-way. This activity alters the vegetation and animal communities and generally leads to the creation of an edge habitat in woodland that promotes greater species diversity. Impacts on farmland include soil compaction from construction equipment and some loss of useful land due to tower bases. The use of 230 kV lines means that the electrical effects associated with high voltages will be small so normal land use activities can take place under the transmission line. The line and towers will be clearly noticeable to people in the immediate vicinity unless shielded by vegetation. Under some circumstances lines may cause mortality to birds due to collisions with the wires and towers.

The primary impact of the buried pipeline will occur during construction due to trenching and access roads. A cleared right-of-way will be required for maintenance during operation but there will not be any visible structures or interference with farming. For rail spurs more extensive construction activity may be required because of the foundation requirements. The operational impacts of a rail spur will include noise and limited disruption of land use activities.

The selection of actual rights-of-way would require detailed study of environmental, engineering and land use factors; such work has not been performed. The objective of the APL study was to determine whether there are any land use factors which would make access to the proposed alternative sites impractical. For this purpose corridor areas were sought in which the rights-of-way could be located. The constraints in selecting the corridors were to minimize damage to natural systems such as upland natural areas and wetlands, limit conflict with existing land uses, and limit impacts on historic and cultural sites. The corridors thus selected are much wider than the actual rights-of-way. They do not represent a final selection of the routes but are only an indication of some feasible siting locations.

Six historic sites are within the corridor areas for Church Creek and two are in the Deep Branch corridor areas. Impacts on the historic structures can be minimized by routing the rights-of-way away from these structures.

Corridors for the Church Creek and Deep Branch sites are shown in Figures 9-2, 9-3, and 9-4. Details of the selection considerations are contained in Chapter 5 of PPSE 8-7. It has been concluded that the designated corridors would not cause major land use, environmental or cultural impacts. Impacts were identified at several locations, however, which would warrant additional study to determine how to best mitigate these effects.

9.6 VISUAL IMPACTS

The most dominant visual elements of the proposed new plant are the stack (560 foot high chimney), the turbine and boiler buildings (100 and 250 feet high) and the natural draft cooling tower (400 feet high with a typical vapor plume of a few hundred meters length). It is also possible that a round mechanical cooling tower (height 65 feet) may be used at an alternative site. In addition, the transmission and rail lines will be visible from many locations.

Assessing the visual impact of a facility is in many respects a qualitative and subjective exercise. In general, it can be said that:

1) The area proposed for expansion at Vienna is already industrial in character, but the expanded facility will be more massive than the present DPL plant. By contrast the areas of Church Creek and Deep Branch are rural. Although the visibility of the plant at these alternative sites will be limited by the larger site size and by shielding from trees, the sight of the plant structures is likely to cause the perceived character of the area to change.

2) The number of people exposed to the view of the plant will be much larger at Vienna than at alternative sites. The number of local residents near the plant site is much larger at Vienna, and by the mid 1980's the average daily traffic count on Route 50 is projected to be 14,000. Because Route 50 is planned to be rerouted to a new elevated bridge north of the present plant, travelers will have a clear view of the power plant.

3) The incremental visual impacts of transmission lines, rail lines and pipelines will be much greater at Church Creek and Deep Branch because the Vienna facility already has such facilities in place.